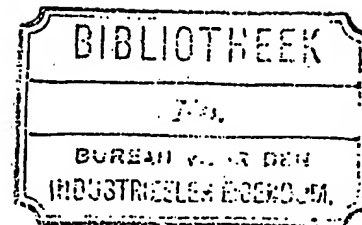


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## PATENT SPECIFICATION



Application Date: Apr. 17, 1920. No. 10,713/20

166,677

Complete Left: Jan. 15, 1921.

Complete Accepted: July 18, 1921.

### PROVISIONAL SPECIFICATION.

#### Improvements in Moisture Eliminators.

We, HEENAN & FROUDE, LIMITED, of Chapel Walks, City of Manchester, a British company, and GEORGE HENRY WALKER, Engineer, with the said company, a British subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in devices for eliminating moisture from air and gas.

It is designed for use with all kinds of apparatus for ensuring intimate contact between air or gases and liquids and more particularly for use with air filters, air coolers, air humidifiers and water coolers, to remove the moisture from the air or gas after passing through such apparatus.

It consists of two or more rows of air baffles placed in the conduit leading from the apparatus or in any other suitable position with spaces between each adjacent baffle for the passage of the air or gas, the rows of baffles being placed one behind the other, the baffles in one row being staggered in relation to those in the preceding row, so that the spaces between the baffles in the first row are overlapped by the baffles in the next row, sufficient space being left between each row of baffles for the passage of the air or gas.

The second row of baffles is formed of trough-shaped elements or channels fixed either vertically or at an angle to the vertical, so that any liquid being deposited on the surface of the troughs, tends to run downwards into a suitable receptacle.

The object of a set of eliminators

arranged in this manner is to trap particles of moisture entrained with the air so that after passing the eliminator the air or gas is free from loose moisture. This is done by proportioning the spaces between the first row of baffles so that the combined air and particles of moisture are caused to flow at high velocity towards the inner surface of the troughs forming the second row of baffles. Owing to the inertia of the drops of moisture these are carried forward on to the surface of the troughs, while the air or gases escape at the sides.

If desired, a third row of baffles of trough shape may be added, or alternately the first and second rows may be duplicated thus forming two or more complete eliminators working in series.

The baffles both of the first and second rows, may be of various shapes such as V shaped, semicylindrical U shaped, or they may be flat with flanges at the sides the flanges being vertical or inclined.

The troughs forming the second row of baffles may be provided with lips running the whole length arranged to entrap any liquid which might otherwise tend to creep over the edges of the blades, and find its way into the outlet from the eliminator. The surfaces opposing the air current may be lined with hydropscopic material.

Dated this 16th day of April, 1920.

J. OWDEN O'BRIEN,  
Successor to and late of  
W. P. Thompson & Co., of Manchester,  
Patent Agent.

## COMPLETE SPECIFICATION.

## Improvements in Moisture Eliminators.

We, HEENAN & FROUDE, LIMITED, of Chapel Walks, City of Manchester, a British company, and GEORGE HENRY WALKER, Engineer, with the said company, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

10 This invention relates to improvements in devices for eliminating moisture from air and gas of the type in which baffles or blades are arranged with spaces between adjacent baffles for the passage  
15 of the air or gas the rows of baffles being placed one behind the other, and in which the baffles in one row are staggered in relation to those in the preceding row, so that the spaces between the baffles in the  
20 first row are overlapped by the baffles in the next row, sufficient space being left between each row of baffles for the passage of the air or gas.

The present invention is designed for  
25 use with all kinds of apparatus for ensuring intimate contact between air or gases and liquids and more particularly for use with air filters, air coolers, air humidifiers and water coolers, to remove  
30 the moisture from the air or gas after passing through such apparatus. It can be applied to any duct, passage, opening or pipe through which air or gas flows.

The invention consists in so arranging  
35 the baffles or blades first meeting the current of air or gas so as to split it into streams flowing at a velocity higher than the main current.

The invention will be described with  
40 reference to the accompanying drawings.

Figs. 1 to 17. Cross sections of various forms of baffles or blades.

Fig. 18. Section through an air filter having approximately vertical screens  
45 showing the eliminator baffles or blades in position.

Fig. 19. Section through an air filter with horizontal screens showing the eliminator baffles or blades in position.

50 In Figs. 1 to 7 and Figs. 12 to 15, the eliminator baffles or blades B B<sup>1</sup> are shown inserted in a duct C preferably rectangular in cross section in which the current of air or gases flow in the direction of the  
55 arrows. A space A is formed between

each pair of baffles or blades B and a space A<sup>1</sup> between each pair of baffles or blades B<sup>1</sup>, the baffles or blades B<sup>1</sup> being arranged behind the baffles or blades B and staggered in relation thereto so that spaces A between the baffles or blades B are overlapped by the baffles or blades B<sup>1</sup>. Sufficient space A<sup>2</sup> is left between the row of baffles or blades B and the row of baffles or blades B<sup>1</sup> for the passage of the  
60 air or gases.

In the form of the baffles or blades shown in Figs. 1, 2, 3, 4, 5, 6, 7, 12, 13, 14, and 15 the baffles or blades B first meeting the current of air or gases split  
70 it into streams flowing at a velocity higher than the main current, so that in passing the openings between each pair of baffles or blades B (that is at the spaces marked A) the air or gases, together with the spots or drops of loose moisture are flowing at comparatively high speed. The current then meets the second row of baffles or blades B<sup>1</sup> which are trough  
75 shaped, and against which the current of air or gases and the drops of moisture are beaten by virtue of the forward velocity imparted to them at the spaces A.

The moisture being of much heavier specific gravity than the air or gases strikes the inner surface of the blades B<sup>1</sup>, and remains thereon until the accumulation of moisture causes it to split up into stream lines and run down the surface of the blades under the action of gravity, capillary attraction causing this moisture to cling to the blades instead of mingling again with the current of air or gases. The latter is bent back by the shape of the second row of blades and escapes at the outlets, formed by the spaces A<sup>1</sup> and A<sup>2</sup>.  
80 85 90 95

It is found that the best results are obtained when the aggregate of areas A<sup>2</sup> totals a greater value than aggregate or  
100 areas A; the reason being that the velocity of the streams of air or gases bent back in the opposite direction to the main current, being small, there is little tendency to oppose the blast of the main current through the spaces A, and the forward velocity of the particles of loose moisture is in this way not hindered.  
105

The drops of loose moisture running down the inner surface of the second row  
110

of blades  $B^1$  are collected by means of a suitable receptacle in which the blades rest.

Or the blades  $B$  may be supported above the receptacle but dipping into the liquid contained therein.

In cases where the blades  $B$   $B^1$  of the eliminator are placed in a horizontal or nearly horizontal position, the moisture clinging to the inner surface of the second row of blades  $B^1$  is prevented from dripping downwards by the blast of air or gases impinging on this surface, and the stream lines of moisture resulting from the formation of liquid on these surfaces collect in the small gutters formed by the lips  $b$  shown in Figs. 3, 5, 7 and 10. A convenient method of collecting the liquid thus caught in the troughs is to incline the blades of the eliminator at an angle more or less acute (as desired) to the horizontal, and the lower end of the blades may be supported by a trough arranged to collect the drip from the end of the blades.

The blades  $B$   $B^1$  shown in Figs. 1 to 7 may be lined (as shown in Figs. 9, 10 and 11) with felt, wool or other hygroscopic material as described in the Specification of our prior Patent No. 134,873.

The form of the blades  $B$   $B^1$  shown in Figs. 1 to 7 permits of only a small aggregate area for the passage of air or gases, and in cases where it is desired to increase this area without causing the apparatus to take up too much space, the alternative forms shown in Figs. 12, and 13 may be adopted.

The principle on which the eliminators shown in Figs. 12 and 13 operate is identical with that described for the simpler form shown in Figs. 1 to 7, but the areas  $A$  aggregate a greater space for the passage of the air or gas through the eliminator.

In these two arrangements the air does not pass from one eliminator to a second in series, and in cases where it is desired to arrange the eliminator in this way it is possible to duplicate the ordinary form of eliminator by placing one behind the other, or alternately the construction shown in Fig. 14 may be adopted. In the latter case the stream of air or gases after passing through the spaces  $A$  passes onward to a second series of spaces  $A^2$ .

The construction shown in Fig. 8 shows a variation in design but not in principle. In this case the area  $A$  may be formed by a truncated cone as indicated, or by an oblong orifice of a cross section similar to the cone, projecting the air or gases in a downward direction on to the surface of a

tray, the liquid collected in which may be drained away by a suitable pipe  $b^2$  or other convenient arrangement. In this case again the areas  $A^2$  aggregate a greater area than area  $A$ .

The construction shown in Fig. 15 is in principle similar to that shown by Figs. 1 to 7, but in this case the baffles or blades  $B$  and  $B^1$  are formed by pressing conical holes in the surface of a flat plate, the holes forming the areas  $A$  and  $A^1$  through which the current of air or gases flows. The depressions  $b^3$  in the plate formed between the adjacent cones are used in the lower plate to collect the moisture which may be drained away by a system of pipes or other convenient arrangement as indicated, or alternately, the eliminator instead of being placed horizontally may be inclined at any desired angle to the horizontal so that the liquid runs down the plate in the depressions, and is collected in a suitable receptacle or into the liquid container in which the lower edges of the plates are immersed.

Fig. 16 shows another variation of the same principle in which the flow of air or gases through a pipe or duct in the direction of the arrow is projected through space  $A$  against the surface of an annular trough  $C$ , the lower end of which is dish shaped to collect the liquid into a suitable drain.

Fig. 17 is similar to Fig. 16 with the exception that additional velocity is imparted to the stream of air or gases through the areas  $A$  by means of a centrifugal fan  $D$  driven at suitable speed of revolution in any convenient manner.

Fig. 18 illustrates an air filter in which the air is forced by a fan through vertical or approximately vertical filtering screens  $E$   $E^1$  down which water is allowed to trickle from troughs  $e$  or on to which water is sprayed. Eliminator blades or baffles  $B$   $B^1$  of similar construction to those described above, are arranged behind the screens  $E$   $E^1$  and dip into the water trough  $F$  at the bottom of the apparatus.

Fig. 19 shows an air filter in which the air is forced through a number of horizontal filtering screens  $G$  by a fan  $H$  and the water is fed on to the screens from two pipes  $g$  arranged above the screens  $G$  one at either side of the apparatus. Eliminator blades or baffles  $B$   $B^1$  of similar construction to those described above are arranged at the top of the apparatus.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to

be performed, we declare that what we claim is:—

1. A device for eliminating moisture from air or gases of the type referred to in which the blades or baffles first meeting the current of air or gases split it into streams flowing at a velocity higher than the main current substantially as described.
2. A device for eliminating moisture from air or gases as in Claim 1 in which the aggregate of the areas of the spaces between the rows of baffles or blades (area  $A^2$ ) is greater than the aggregate of the area of the spaces between the baffles or blades in the first row (area A) substantially as described.
3. A device for eliminating moisture from air or gases constructed substantially as described with reference to Figs.

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 17 of the drawings.

4. A filter for air or gases, provided with a moisture eliminator constructed as a whole substantially as described with reference to Fig. 18 or Fig. 19 of the drawings.

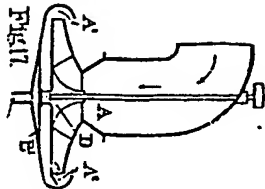
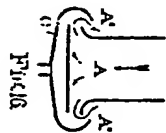
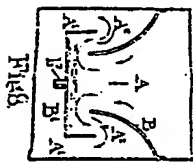
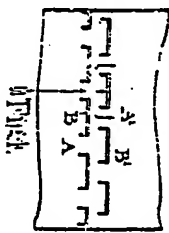
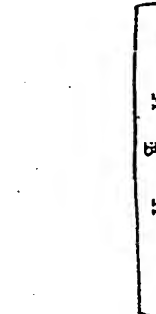
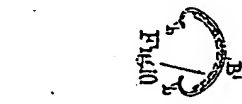
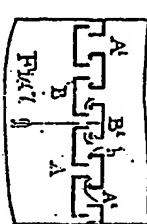
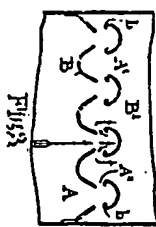
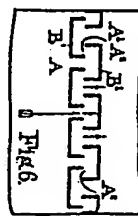
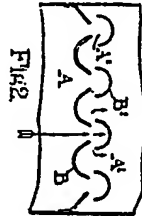
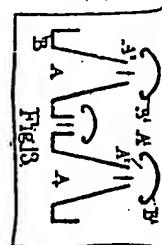
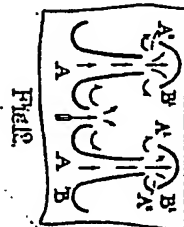
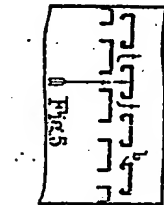
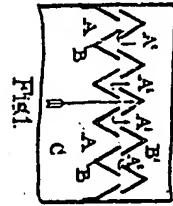
Dated this 6th day of January, 1921.

J. OWDEN O'BRIEN,  
Late W. P. Thompson & Co., of  
Manchester,  
Patent Agent.

Reference has been directed, in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 and 1919, to Specifications No. 2025 of 1900, No. 3860 of 1902, No. 8208 of 1908, No. 25,821 of 1911, No. 10,577 of 1912, No. 493 of 1915, and No. 134,873.

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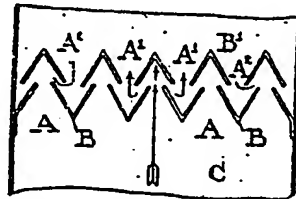


Fig. 1.

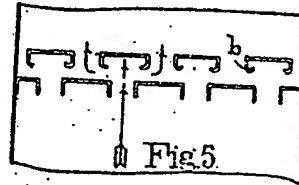


Fig. 5.

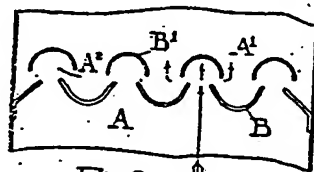


Fig. 2.

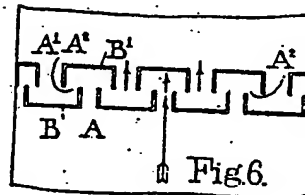


Fig. 6.

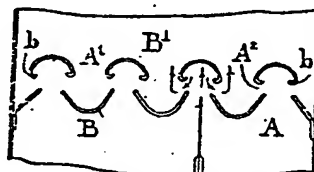


Fig. 3.

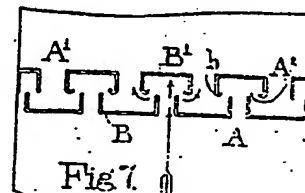


Fig. 7.

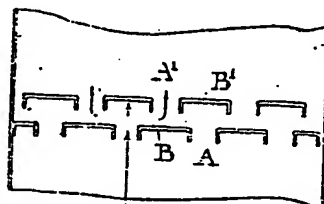


Fig. 4.

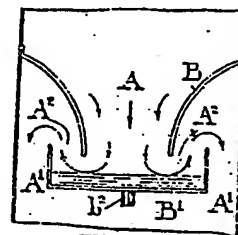


Fig. 8.



Fig. 9.

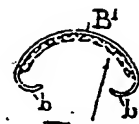


Fig. 10.

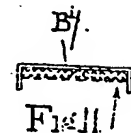


Fig. 11.

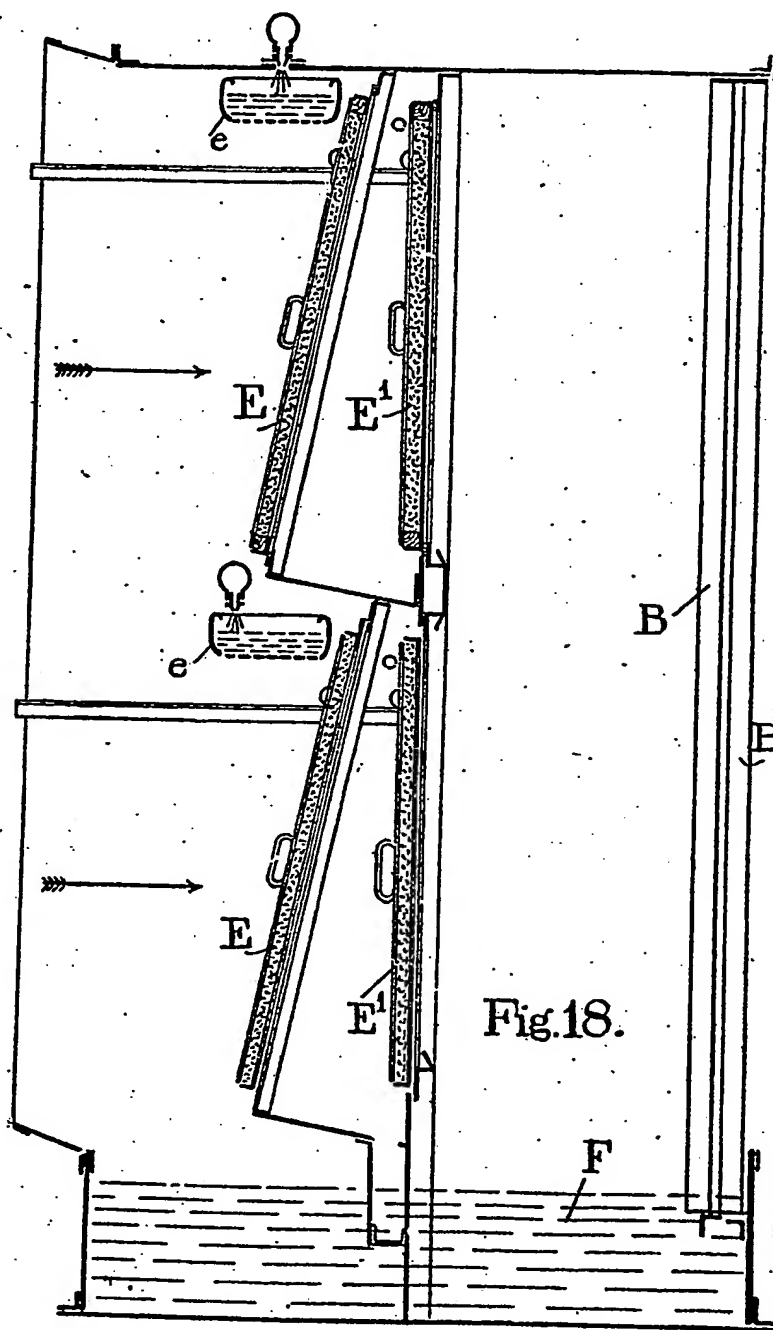
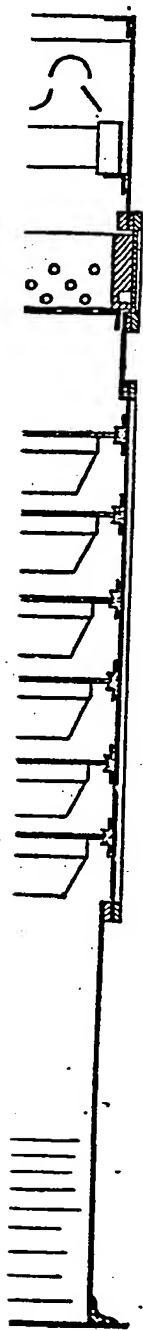


Fig. 18.

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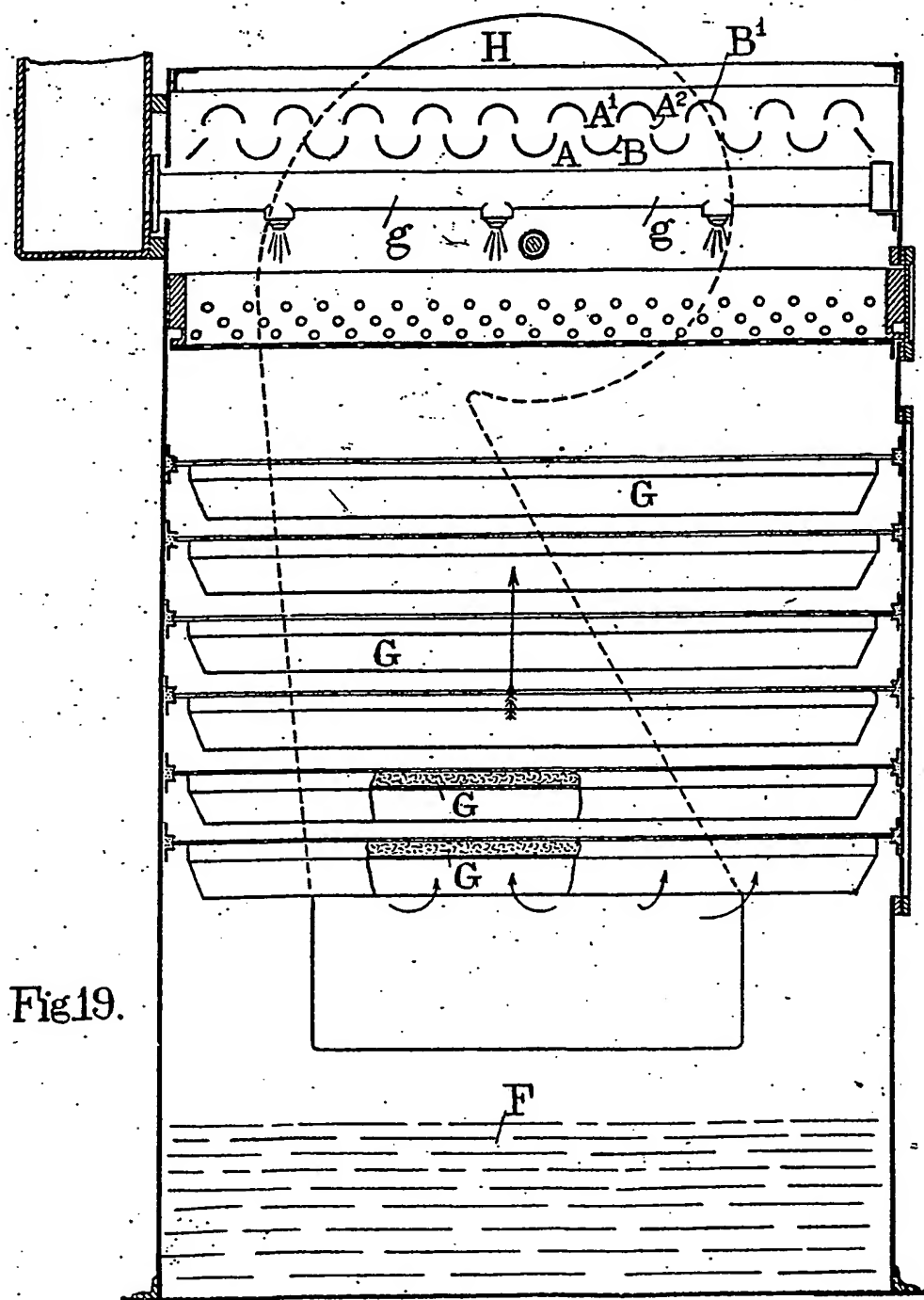


Fig 19.

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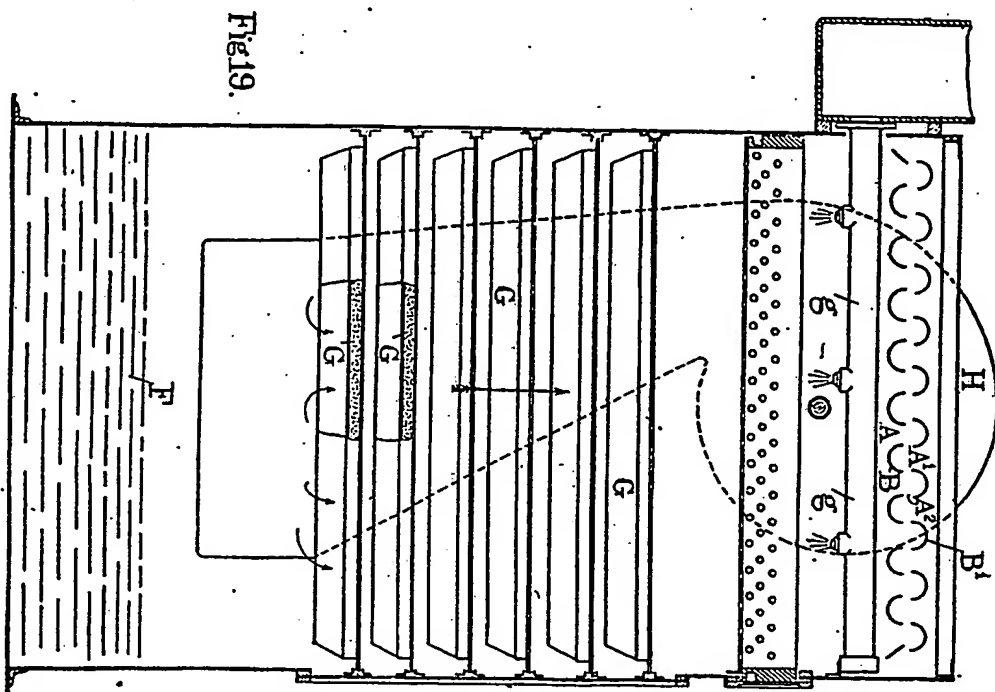


Fig. 19.

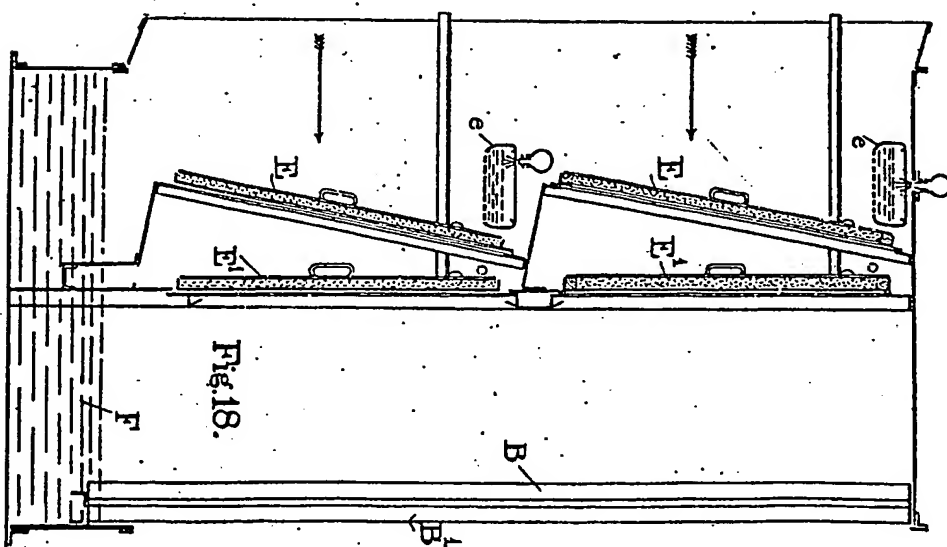


Fig. 18.



Fig 9

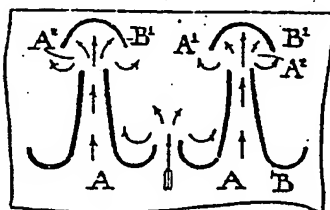


Fig 12

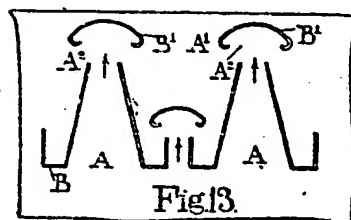


Fig 13



Fig 10

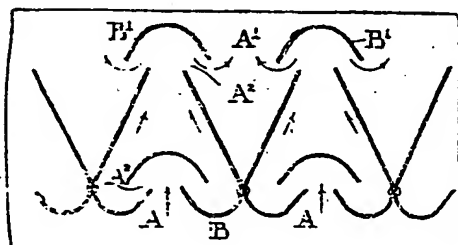


Fig 14

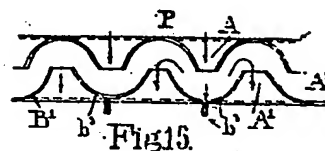


Fig 15

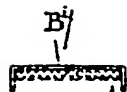


Fig 11

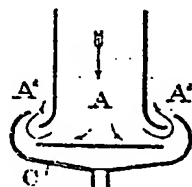


Fig 16

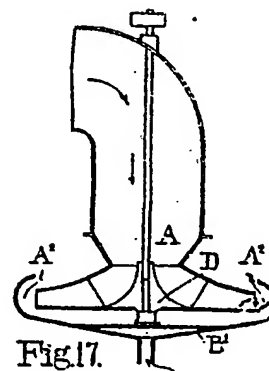


Fig 17

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